PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
) Examiner: S. Wiley
Panusopone, et al.)
) Art Unit: 2671
Application No.: 09/587,961)
)
Filed: June 6, 2000)
)

For: **GLOBAL MOTION ESTIMATION FOR SPRITE GENERATION**

Commissioner for Patents
Washington, D.C. 20231

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Commissioner for Patents, Washington, D.C. 20231 on September 6, 2002.

By: Carol Prentice
Carol Prentice

RESPONSE

Dear Sir:

This Response is responsive to the Office Action mailed on May 23, 2002, for which a petition and fee for a one month extension of time are being filed concurrently herewith.

Summary

Claims 1-22 are pending.

Claims 1 and 18 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Crinon (US 6,205,260).

Claims 3, 5-11, 15-17, 19 and 21-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Crinon.

Claims 2, 4, 12-14, and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Crinon in view of an article by Bergen entitled "*A Three-Frame algorithm for Estimating Two-Component Image Motion*".

Applicants respectfully traverse these rejections in view of the following comments.

Discussion of Crinon

Crinon proposes an extension to MPEG-4 sprite processing which automatically segments the foreground from the input video and builds sprites based only on the background content (Col. 1, line 63 through Col. 2, line 11). Crinon is mainly concerned with how to incorporate this segmentation routine into the sprite coder and the MPEG-4 structure.

In contrast, the present invention is directed toward improving the performance of global motion estimation by introducing a new initial estimation process and a new outlier rejection process.

Rejection of Independent Claims 1 and 18 as Being Anticipated By Crinon

The Examiner has rejected Applicants' independent claims 1 and 18 as being anticipated by Crinon. The Examiner has indicated that "Crinon teaches a method for generating a sprite from an initial input image (col. 4, lines 15-21), wherein motion is estimated using data from the two previous frames (col. 5, 5-10)." Office Action, Page 2.

Applicants' claims 1 and 18 disclose a new initial estimate of motion parameter data for use in generating a sprite from an initial input image. The initial estimate of motion parameter data provides a registration between the sprite and the initial input image. This initial estimate is based on motion parameter data of at least two input images that precede the initial input image.

Therefore, Applicants' invention is not limited to building a sprite from two input images as apparently assumed

by the Examiner. Rather, Applicants' invention uses the motion parameter data of at least two input images to obtain an initial estimate of motion parameter data for providing a registration between the sprite the initial input image from which the sprite will be generated. In other words, the sprite is not built from the two input images, but rather the motion parameter data from these two input images is used to determine an initial input image which will be used to build the sprite.

In the MPEG-4 Video Verification Model (M3100), perspective motion estimation works under the assumption that there is a small deformation among consecutive images, so that the motion parameter data of the most recent image is used as an initial estimation. This leads to accurate results only where the input sequence contains only slow motion. The present invention as set forth in claims 1 and 18 solves this problem and provides accurate results for fast motion input sequences by using past motion history of at least two preceding input images to determine the initial estimation. See, e.g., Applicants' disclosure, page 17, line 21 through page 18, line 8.

Crinon does not appear to address the initial estimation problem inherent in the MPEG-4 video verification model. In particular, Crinon does not disclose or remotely suggest providing an initial estimate of motion parameter data based on motion parameter data of at least two input images that precede the initial input image, as set forth in Applicants' claims 1 and 18. Despite the Examiner's contentions, Applicants do not find any suggestion or disclosure of using data of at least two input images that precede the initial input image to obtain an initial estimate of motion parameter data in Crinon Col. 5, lines 5-10 or lines 18-51. Although Crinon will detect a new background area if there has been no change in the image

content over the last two video frames (Col. 5, lines 49-51), this is not the same as providing an initial estimate of motion parameter data for providing a registration between the sprite and the initial input image based on motion parameter data of at least two input images that precede the initial input image, as claimed by Applicants.

Rejection of Independent Claims 6 and 19 as Being Unpatentable Over Crinon

The Examiner has rejected Applicants' independent claims 6 and 19 as being unpatentable over Crinon. The Examiner indicates that "Crinon teaches a method for generating a sprite from a plurality of input images (col. 4, lines 15-21), including the step of selecting an optimal viewpoint for optimizing certain characteristics (col. 10, 50-67)." Office Action, page 3.

Selecting an optimal viewpoint as performed in Crinon does not equate to performing shot selection on the input images to obtain a group of successive images that share a common scene for use in forming the sprite as claimed by Applicants in claims 6 and 19.

The Examiner is correct in indicating that Crinon does not disclose shot detection to obtain successive images. The Examiner's assertion that shot detection to detect successive images is obvious from Crinon is mistaken, as Crinon itself does not discuss shot detection as claimed by Applicant. In Crinon, it is disclosed that it may be more desirable to view certain images to the left or right of an object center plane in order to optimize viewing characteristics of the image mosaic (Col. 10, lines 58-60). In contrast, shot detection as disclosed by Applicants refers to reviewing the input images to obtain a group of successive images that share a common scene

for use in forming the sprite. A shot is defined as a sequence of images covering the same scene from a single camera. See, e.g., Applicants' specification, page 16, lines 4-21.

Further, it would not be obvious from Crinon employ shot detection to obtain successive images having a common scene for use in forming the sprite, as claimed by Applicants.

Crinon does not disclose or remotely suggest using shot detection to obtain a group of successive images that share a common scene for use in forming the sprite, as set forth in Applicants' claims 6 and 19.

Rejection of Independent Claims 15 and 21 and dependent claim 16 as Being Unpatentable Over Crinon

The Examiner has rejected Applicants' independent claims 15 and 21 as being unpatentable over Crinon. The Examiner indicates that "Crinon teaches a method for generating a sprite from an initial input image (col. 4, lines 15-21), wherein motion is estimated using data from the two previous frames (col. 5, 5-10). Crinon further teaches constructing multiple sprites and encoding their data separately (col. 2, 33-45)." Office Action, page 4.

Column 2, lines 33-45 of Crinon referenced by the Examiner disclose only that multiple sprites are built and used as appropriate. Crinon uses as an example a situation where a camera goes back and forth between two participants in front of two different backgrounds. In such an example, two background sprites will be built and used, one for each of the two backgrounds. Using a different sprite for a different background is far removed from the subject matter of Applicants' claims 15 and 21.

In Applicants' claims 15 and 21, the input image comprises interlaced first and second fields. First and second field

sprites are generated having separate motion parameter data for the first and second fields, respectively.

Crinon simply does not address sprite generation from an interlaced source as set forth in Applicants' claims 15 and 21. Crinon, like the MPEG-4 standard, only discusses the processing of sprites in a frame format, not a field format.

Crinon does not disclose or remotely suggest sprite generation for respective image fields of an interlaced input image as claimed by Applicants in independent claims 15 and 21.

Similarly, Crinon does not disclose or remotely suggest the subject matter of Applicants' dependent claim 16, which provides a presentation engine for combining the first and second field sprites to form a combined sprite output. The Examiner's assertion that the subject matter of Applicants' claim 16 is obvious since the two sprites would have to be combined or the image would be incomplete is misplaced. It cannot be obvious from Crinon to combine sprites representing respective fields of the input image, since Crinon does not disclose or remotely suggest generating a sprite for each field of an interlaced source in the first place.

Rejection of Independent Claims 17 and 22 as Being Unpatentable Over Crinon

The Examiner has rejected independent claims 17 and 22 as being unpatentable over Crinon.

Applicants claims 17 and 22 relate to decoding of sprites generated from respective first and second field data from the two fields of an interlaced input image. As discussed above in connection with claims 15 and 21, Crinon discusses processing of sprites on a frame basis only, and not based on fields from an interlaced source. Therefore, decoding field-based sprites generated from an interlaced input image having first and

second fields as set forth in Applicants' claims 17 and 22 cannot be considered obvious from Crinon.

Discussion of Bergen

Bergen discloses an iterative motion estimation method using an incremental motion estimator, alignment, and coarse-fine alignment. MPEG-4 sprite generation uses a similar type of algorithm.

In particular, Bergen proposes an algorithm for estimating motion where two motion components exist. Tracking and nulling mechanisms are applied to three consecutive image frames in order to separate and estimate the individual motion components (Abstract).

Rejection of Claims 12 and 20 as Being Unpatentable Over Crinon in View of Bergen

The Examiner indicates that Bergen teaches using an error to refine a first estimate into a second estimate, and that it would have been obvious to combine Bergen with Crinon to arrive at the invention of claims 12 and 22 (Office Action, page 6).

However, the first and second errors of Applicants' claims 12 and 22 are the errors between the pixels of the input image and the pixels of the sprite based on at least first and second estimates of motion parameter data. In Bergen, the error is the error in the estimation of the motion between the images, and not the error between a sprite and the input image.

Applicants' respectfully submit that it would not be obvious to one skilled in the art to combine the disclosure of Bergen with that of Crinon to arrive at the claimed invention, as Bergen does not discuss sprite generation.

Further, neither Bergen or Crinon disclose that the pixels whose second error exceeds their first error are eliminated when generating the sprite, as set forth in Claims 12 and 22.

Applicants respectfully submit that the present invention is not anticipated by and would not have been obvious to one skilled in the art in view of Crinon or Bergen, taken alone or in combination with any of the other prior art of record.

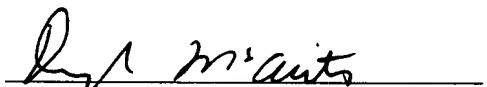
Further remarks regarding the asserted relationship between Applicants' claims and the prior art are not deemed necessary, in view of the foregoing discussion. Applicants' silence as to any of the Examiner's comments is not indicative of an acquiescence to the stated grounds of rejection.

Withdrawal of the rejections under 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a) is therefore respectfully requested.

Conclusion

The Examiner is respectfully requested to reconsider this application, allow each of the pending claims and to pass this application on to an early issue. If there are any remaining issues that need to be addressed in order to place this application into condition for allowance, the Examiner is requested to telephone Applicants' undersigned attorney.

Respectfully submitted,



Douglas M. McAllister
Attorney for Applicant(s)
Registration No. 37,836
Law Office of Barry R. Lipsitz
755 Main Street, Bldg. 8
Monroe, CT 06468
(203) 459-0200

Date: September 6, 2002
ATTORNEY DOCKET NO.: GIC-610